

Blood Lead Concentration and Delayed Puberty in Girls

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Key Words: lead, puberty, menarche, development, NHANES III

Environmental lead exposure has been linked to alterations in growth and endocrine function. It is not known whether such exposure affects pubertal development. Exposure to lead could be in a variety of media (air, water, soil, food) and thus is of interest to many program offices in EPA. We analyzed the relations between blood lead concentration and pubertal development among girls (defined as females 8–18 years of age) who were enrolled in a cross-sectional study (the third National Health and Nutrition Examination Survey) in which race was self-reported or proxy-reported: 600 were non-Hispanic white, 805 were non-Hispanic African-American, and 781 were Mexican-American girls. Puberty was measured on the basis of the age at menarche and Tanner stage for pubic hair and breast development. Geometric mean lead concentrations were less than 3 µg per deciliter (0.144 µmol per liter) in all three groups. As compared with concentrations of 1 µg per deciliter (0.048 µmol per liter), lead concentrations of 3 µg per deciliter were associated with decreased height ($p < 0.001$) after adjustment for age, race, and other factors, but not with body mass index or weight. Blood lead concentrations of 3 µg per deciliter were associated with significant delays in breast and pubic hair development in African-American and Mexican-American girls. The delays were most marked among African-American girls; in this group, the delays in reaching Tanner stages 2, 3, 4, and 5 associated with a lead concentration of 3 µg per deciliter compared with 1 µg per deciliter were 3.8, 5.3, 5.8, and 2.1 months, respectively, for breast development and 4.0, 5.5, 6.0, and 2.2 months, respectively, for pubic hair development; the associated delay in age at menarche was 3.6 months. In white girls, there were nonsignificant delays in all pubertal measures in association with a lead concentration of 3 µg per deciliter. These data suggest that environmental exposure to lead may delay growth and pubertal development in girls, although confirmation is warranted in prospective studies.